

## CLAIMS

1. A machine for applying reinforcing strapping to bulk boxes, comprising:  
a plurality of spaced apart strapping head assemblies each having means for  
applying a length of reinforcing strapping around a box, and securing the strapping in  
encircling relationship to the box, said strapping head assemblies arranged in series  
5 for application of a plurality of straps to the box in predetermined spaced locations on  
the box as the box is advanced through the machine.

2. A machine as claimed in claim 1, wherein:  
a pair of strapping head assemblies are arranged to simultaneously apply a pair  
of straps in encircling relationship to a box at predetermined spaced locations on the  
box as the box advances through the machine.

3. A machine as claimed in claim 2, wherein:  
the reinforcing strap is six hundred pound strapping.

4. A machine as claimed in claim 1, wherein:  
each strapping head assembly comprises a strapping head having means for  
pulling a length of strapping material from a supply, and track means extending around  
the box for guiding the strapping from the head, around the box and back to the  
5 strapping head; and  
said strapping head has means for securing the strapping together to form a  
closed loop, and cutting the loop from the length of strapping supplied from the head.

5. A machine as claimed in claim 4, wherein:

the box is supplied to the strapping head assembly in knocked-down, flattened condition; and

5 the track means comprises upper and lower elongate members extending substantially parallel to one another, and joined at opposite ends by short upright members to form an elongate, narrow rectangular opening through which the box is moved.

6. A machine as claimed in claim 1, wherein:

a plurality of pairs of strapping head assemblies are arranged in series for application of pairs of strapping in predetermined spaced locations on boxes as the boxes are advanced through the machine.

7. A machine as claimed in claim 1, wherein:

sensor means is associated with the strapping head assemblies to detect the presence and position of a box advancing through the machine; and

5 stop means is operative in response to said sensor means to stop a box at a predetermined position relative to a strapping head assembly for application of strapping by that head assembly to a predetermined location on the box.

8. A machine as claimed in claim 6, wherein:

sensor means is associated with each pair of strapping head assemblies to detect the presence and position of a box advancing through the machine; and

5 stop means is operative in response to said sensor means to stop a box at a predetermined position relative to a pair of strapping head assemblies for application of strapping by that pair to predetermined locations on the box.

9. A machine as claimed in claim 7, wherein:  
a recovery strapping head assembly is positioned after said plurality of strapping head assemblies to apply to the box any strap or straps missed by said plurality of strapping head assemblies.

10. A machine as claimed in claim 8, wherein:  
a recovery strapping head assembly is positioned after said plurality of pairs of strapping head assemblies to apply to the box any strap or straps missed by said plurality of pairs of strapping head assemblies.

11. A machine as claimed in claim 1, wherein:  
said strapping head assemblies are capable of operating independently of one another, whereby if one or more strapping head assemblies become inoperative, the remaining strapping head assemblies can still apply reinforcing strapping to the box.

12. A machine as claimed in claim 10, wherein:  
said strapping head assemblies are capable of operating independently of one another, whereby if one or more strapping head assemblies become inoperative, the remaining strapping head assemblies can still apply reinforcing strapping to the box.

13. A machine as claimed in claim 11, wherein:  
each strapping head assembly is mounted on rollers for easy movement laterally out of the machine to facilitate maintenance, adjustment or replacement of the strapping head assembly.

14. In a machine for applying reinforcing strapping to boxes, wherein at least one strapping head assembly is positioned to apply reinforcing strapping to the box as it advances through the machine, the improvement comprising:

5 a recovery strapping head assembly positioned after said at least one strapping head assembly and operable to apply to the box any strap or straps missed by said at least one strapping head assembly.

15. A machine as claimed in claim 14, wherein:

a plurality of strapping head assemblies are arranged in series to apply a plurality of spaced reinforced straps on the box at predetermined spaced apart locations on the box as the box advances through the machine; and

5 said recovery strapping head assembly is operable to apply any one or all straps intended to be applied by the plurality of strapping head assemblies, when any one or all of the strapping head assemblies fail to apply a strap or straps.

16. A method of applying a plurality of reinforcing straps in predetermined spaced locations on a bulk box while the box is in a knocked-down or flattened condition, comprising the steps of:

5 providing a plurality of spaced apart strapping head assemblies each operable to apply a reinforcing strap to the box at a predetermined location on the box;  
moving a box through the machine and past the strapping head assemblies;  
stopping the box in a predetermined position at each strapping head assembly;  
operating each strapping head assembly while the box is stopped to loop a strap around the container, apply tension to the strapping, secure the strapping to  
10 itself to form a loop of strapping closely encircling the container, and cut the loop from the supply.

17. A method as claimed in claim 16, including the steps of:  
simultaneously moving a plurality of boxes through the machine;  
stopping all of the boxes at the same time, with each box positioned at a  
strapping head assembly; and

5 simultaneously operating all strapping head assemblies to simultaneously apply  
straps to all of the boxes.

18. A method as claimed in claim 17, including the steps of:  
providing a plurality of pairs of strapping head assemblies arranged in series in  
the machine; and  
simultaneously applying a pair of straps to each box as the boxes are stopped.